Name:

at1124exam: Radicals and Squares (v906)

Question 1

Simplify the radical expressions.

$\sqrt{44}$ $\sqrt{27}$ $\sqrt{98}$

$\sqrt{2 \cdot 2 \cdot 11}$ $\sqrt{3 \cdot 3 \cdot 3}$ $\sqrt{7 \cdot 7 \cdot 2}$

$2\sqrt{11}$ $3\sqrt{3}$ $7\sqrt{2}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-8)^2}{9} + 2 = 11$$

First, subtract 2 from both sides.

$$\frac{(x-8)^2}{9} = 9$$

Then, multiply both sides by 9.

$$(x-8)^2 = 81$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 8 = \pm 9$$

Add 8 to both sides.

$$x = 8 \pm 9$$

So the two solutions are $x = 17$ and $x = -1$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 10x = -16$$

$$x^2 + 10x + 25 = -16 + 25$$
$$x^2 + 10x + 25 = 9$$
$$(x+5)^2 = 9$$
$$x + 5 = \pm 3$$
$$x = -5 \pm 3$$
$$x = -2 \quad \text{or} \quad x = -8$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 3x^2 - 30x + 83$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 - 10x) + 83$$

We want a perfect square. Halve -10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 - 10x + 25 - 25) + 83$$

Factor the perfect-square trinomial.

$$y = 3((x-5)^2 - 25) + 83$$

Distribute the 3.

$$y = 3(x-5)^2 - 75 + 83$$

Combine the constants to get **vertex form**:

$$y = 3(x-5)^2 + 8$$

The vertex is at point $(5, 8)$.